

MULTIMEDIA



UNIVERSITY

STUDENT ID NO

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# MULTIMEDIA UNIVERSITY

## MODULE TEST #3

TRIMESTER 1, 2020 / 2021

**ECE3296 – DIGITAL IMAGE AND VIDEO PROCESSING**  
(CE)

15 OCTOBER 2020  
8.30 p.m. - 9.30 p.m.  
(1 Hour)

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### INSTRUCTIONS TO STUDENT

1. This question paper consists of **3** printed pages with **FOUR** questions only.
2. Answer **ALL** questions.
3. Write your answers in the Answer Booklet.

(1) Figure 1 shows a  $7 \times 7$  image for segmentation. Using the shaded and underlined pixel as the seed pixel, apply the region growing technique on the image, based on the following parameters:

- 4-connectivity, difference between pixel values less or equal to 5
- 8-connectivity, difference between pixel values less or equal to 5
- 4-connectivity, difference between pixel values less or equal to 10

93	90	88	69	70	81	83
85	84	60	64	59	62	82
84	82	69	<u>60</u>	64	66	80
80	59	63	70	75	68	81
67	64	60	80	85	99	102
71	67	65	90	97	100	105
83	70	85	90	101	103	107

Figure 1

[9 marks]

(2) Edge detection algorithms are usually followed by linking procedures to assemble edge pixels into meaningful edges. Briefly describe the three approaches for edge linking and boundary detection.

[6 marks]

(3) Gray-level co-occurrence matrix (GLCM) is one of the most popular descriptors to describe textures.

(i) Compute the GLCM of displacement  $\mathbf{d} = (0,1)$  for the  $5 \times 5$  image shown in Figure 2 below:

2	1	2	0	1
0	2	1	1	2
0	1	2	2	0
1	2	2	0	1
2	0	1	0	1

Figure 2

[5 marks]

(ii) List four (4) features that can be extracted from the co-occurrence matrix.

[2 marks]

(4) As a computer programmer, you are required to design a program that can train the computer to recognize any given texture image. A large texture image dataset with known classes for all its images is made available to you to train the computer. Some samples from the dataset is shown in Figure 3. Design your program by formulating a hypothesis for each stage of image processing system below:

- Pre-processing
- Segmentation
- Representation and description
- Recognition and interpretation



[8 marks]

**End of Paper**